

Valveless Detonation Concepts for Space Exploration

Completed Technology Project (2011 - 2015)



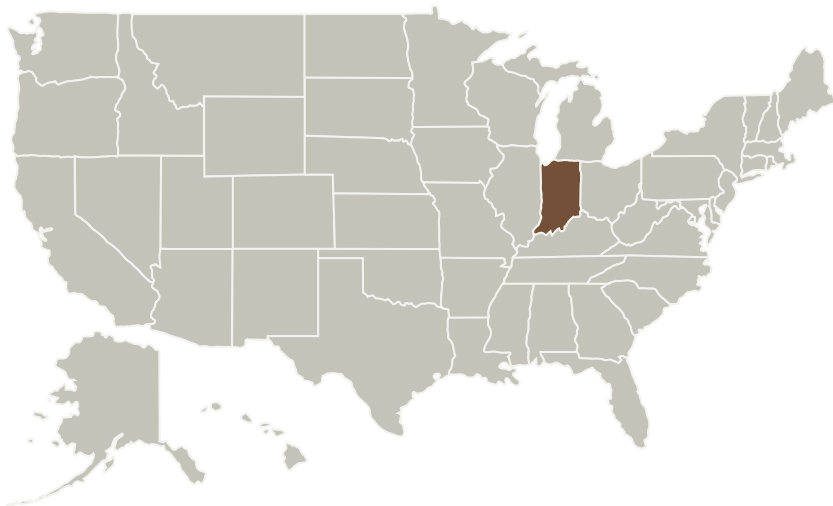
Project Introduction

The objective of the proposal is to develop a valveless pulse detonation engine (PDE) and provide performance metrics for comparison to traditional propulsion systems. The proposed research program will have the following elements: Development of a lumped-parameter transient hydraulic model to aid in the design of manifold/injector combinations with a tuned resistance to support valveless detonation behavior Experimental investigation into the performance of a lab-scale combustor under valveless detonation mode operation. This investigation will include high-rate pressure measurements to facilitate performance calculations for comparison against conventional options. A systems study to ascertain the overall benefit of the pulse detonation cycle relative to a conventional pressure or pump fed rocket. Valveless PDE technology has the potential to provide costs savings in inert weight, simplicity in manufacturing, and increases to efficiency for rocket propulsion systems. These benefits aim to provide greater mission capability.

Anticipated Benefits

Valveless PDE technology has the potential to provide cost savings in inert weight, simplicity in manufacturing, and increases to efficiency for rocket propulsion systems. These benefits aim to provide greater mission capability.

Primary U.S. Work Locations and Key Partners



Project Image Valveless Detonation Concepts for Space Exploration

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Space Technology Research Grants

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Organizations Performing Work	Role	Type	Location
Purdue University-Main Campus	Supporting Organization	Academia	West Lafayette, Indiana

Primary U.S. Work Locations
Indiana

Images

**4321-1363268472217.jpg**

Project Image Valveless Detonation
Concepts for Space Exploration
(<https://techport.nasa.gov/image/1842>)

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

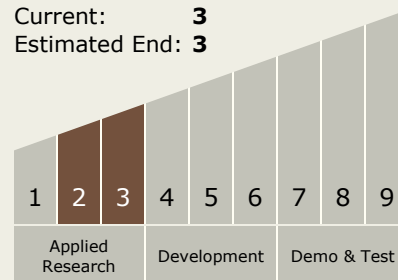
Steve Heister

Co-Investigator:

Brandon Kan

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



Technology Areas

Primary:

- TX01 Propulsion Systems
 - TX01.3 Aero Propulsion
 - TX01.3.4 Pressure Gain Combustion